

IGCSE Chemistry Mock Mark-scheme 2014

Question number	Answer	Accept	Reject	Marks
1. (a) (i)	M1 - at least two layers of circles drawn with the majority touching one another			1
	M2 - no regular pattern overall			1
(ii)	(particles/they are) <u>more</u> closely packed or (particles they are) <u>closer</u> together or <u>more</u> (particles of them) in a given volume/in the tank	<u>less</u> space between particles, etc molecules or atoms for particles reverse arguments	oxygen in place of particles	1
			<i>Total</i>	③
(b) (i)	M1 - bright/brilliant/blinding/white flame	light for flame	any other colour glow for flame	1
	M2 - <u>white</u> powder / solid / smoke / ash			1
(ii)	MgO	correct formula as part of an equation		1
(c) (i)	base/alkali	basic/alkaline (it) forms hydroxide ions (in water)	contains hydroxide ions	1
(ii)	OH ⁻ / hydroxide			1
			Total	8

Question number	Answer	Accept	Reject	Marks
2 (a) (i)	D	d		1
(ii)	A	a		1
(b)	M1 - B	b		1
	M2 - the spots do not line up (with any of the blue, red or yellow spots)	the colours do not match (with any one of blue, red or yellow) the spots are not the same (as those for blue, red or yellow)	contains other colours	1
	M2 dependant on M1			
			Total	4

Question 3

Question number	Expected Answer	Accept	Reject	Marks												
(a)	<table><tr><td></td><td>Proton</td><td>Neutron</td><td>Electron</td></tr><tr><td>relative mass</td><td>1</td><td>1</td><td></td></tr><tr><td>relative charge</td><td></td><td>0</td><td>-1</td></tr></table> <p>1 mark for each correct answer</p>		Proton	Neutron	Electron	relative mass	1	1		relative charge		0	-1	+1	- 1 / one Zero minus one /negative	4
	Proton	Neutron	Electron													
relative mass	1	1														
relative charge		0	-1													
(b) (i)	Protons <u>AND</u> electrons = 1 neutrons = 2	one two		1 1												
(ii)	<u>atoms</u> of the same element with different masses Ignore references to electrons	atoms with same atomic number / number of protons / proton number with different mass numbers / different numbers of neutrons / different neutron numbers	molecules / compounds for first mark only different relative atomic masses for second mark only	1 1												

Question number	Expected Answer	Accept	Reject	Marks
(c)	$((79 \times 50.7) + (81 \times 49.3))/100$ OR $(79 \times 0.50.7) + (81 \times 0.493)$ = 79.99 Allow 1 mark for a single transcription error (e.g. 43.9 instead of 49.3) Ignore units such as grams	Correct answer on its own scores 2		1 1
			Total	10

Question 4

Question number			Answer	Notes	Marks
a	i	M1	H—O—H with both bonds represented by 2 shared electrons	Accept 2 dots, 2 crosses or 1 of each Atoms do not have to be labelled with H or O If wrongly labelled, only M1 can be awarded	1
		M2	8 electrons in outer shell of O AND 2 electrons in outer shell of both H	Ignore inner shell of O Reject if H has 2 shells M2 dependent on M1	1
	ii	M1	(strong electrostatic) attraction between bonding/shared pair of electrons	Must refer to pair or two electrons	1
		M2	and nuclei (of hydrogen and oxygen)	Accept word nucleus instead of nuclei If clear reference to 2 atoms 0/2 if any mention of ions / electron transfer M2 dependent on mention of both attraction and electrons in M1	1
Question number			Answer	Notes	Marks
b	i	M1	idea of electron transfer / loss and gain of electrons		1
		M2	direction of transfer, eg sodium to oxygen / sodium loses and oxygen gains		1
		M3	correct number of electrons involved, eg (each) sodium loses 1 and oxygen gains 2	Ignore charges on ions Ignore covalent 0/3 if any mention of electron sharing All marks may be scored on diagrams or by reference to electronic configurations Max 2 if molecules mentioned	1
	ii	M1	(sodium) loses electron(s)	Ignore oxygen gains electrons	1
Question number			Answer	Notes	Marks
c		M1	attractions between water molecules are weak(er) / easily overcome / need little energy to break	Allow (named) intermolecular forces in place of attractions	1
		M2	attractions between (sodium and oxide) ions are strong(er) / ionic bonds are strong / need a lot of energy to break	Do not award M2 if any mention of intermolecular forces / metallic bonding Any implication of <u>breaking</u> covalent bonds = 0/2	1
Question number			Answer	Notes	Marks
d	i	M1	s	All three correct = 2 marks Two correct = 1 mark One/none correct = 0 marks Do not award M1 for g or if not possible to be sure that it is s and not g Do not award marks for abbreviations such as sol / liq	2
		M2	l		
		M3	aq		
	ii	M1	blue / purple	Allow indigo or violet	1
M2		OH ⁻ / hydroxide	M1 and M2 independent	1	

Total 14 marks

Question number			Answer			Notes	Marks	
5.			M1	Na <u>13.8</u> 23	Br <u>47.9</u> 80	O <u>38.3</u> 16	0/3 if division by atomic number(s) /division wrong way round If only two elements shown correctly, only M1 can be awarded	1
			M2	0.6	0.6	2.4	Accept 1 : 1: 4	1
			M3	NaBrO ₄			Accept elements in any order Penalise M3 for incorrect symbol, eg SBrO ₄ or NaBO ₄	1
							Dividing by 160 instead of 80 gives Na2BrO8 Dividing by 32 instead of 16 gives NaBrO2 Award 2 in these cases Both these errors give Na2BrO4 Award 1 in this case	
							Correct final answer scores 3 marks	
							Total	3

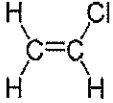
Question 6

Question number			Answer	Notes	Marks
a	i	M1	Chlorine / Cl_2	Allow Cl Accept phonetic spellings Do not penalise poorly written formulae such as CL / cl / cL	1
		M2	Iodine / I_2	Allow I Accept phonetic spellings	1
	ii	M1	Astatine / At_2	Allow At Accept phonetic spellings Do not penalise poorly written formulae such as AT / at / aT	1
b		M1	$\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$	correct formulae = 1 balancing = 1	1
		M2		Max 1 for symbol or formula error, eg HcL, Cl^2	1

Question number			Answer	Notes	Marks
c	i	M1	red	<i>→ not precise enough</i>	1
		M2	(hydrochloric) acid / hydrogen ions / H^+ (formed)	Ignore acidic and references to pH	1
	ii	M1	blue	Also dissociation not in (ci) ↓	1
		M2	no reaction/acid/hydrogen ions/ H^+ (formed)	Allow no colour change Do not accept changes (from red) to blue Reject any reference to alkaline Ignore not acidic and references to pH Ignore reference to not dissolving	1

Total 9 marks

Question number	Answer	Accept	Reject	Marks
7. (a)	$C_{12}H_{22}O_{11} + H_2O \rightarrow 2C_6H_{12}O_6$ Ignore yeast		lower case symbols and numbers not given as subscripts	1
(b) (i)	no more bubbles/fizzing/effervescence IGNORE when no more ethanol is formed/all the glucose has reacted/all the yeast has reacted/references to mass/references to temperature	no more gas/carbon dioxide given off		1
(ii)	filtration/filtering IGNORE sieving	decant	evaporation/distillation	1
(c) (i)	(the elements of) water removed	H ₂ O removed 2 hydrogen (atoms) and 1 oxygen (atom) are removed		1
(ii)	aluminium oxide/Al ₂ O ₃ <i>Porcelain</i>	(concentrated) sulfuric acid (concentrated) phosphoric acid	dilute acid phosphorus/phosphorous	1
(iii)	chlorine (gas) / Cl ₂ If both name and formula given, both must be correct	correct name or formula as part of an equation	chloride / Cl ⁻	1
(iv)	$CH_2ClCH_2Cl \rightarrow CH_2(=)CHCl + HCl$	C ₂ H ₄ Cl ₂ for CH ₂ ClCH ₂ Cl and C ₂ H ₃ Cl for CH ₂ =CHCl		1

Question Number	Answer	Accept	Reject	Marks
7 (d) (i)	 <p>IGNORE bond angles and positions of H and Cl relative to each other</p>			1
(ii)	<p>Any three from:</p> <p>M1 - (one bond in the) double bond breaks</p> <p>M2 - small molecules/monomers/chloroethene molecules join together</p> <p>M3 - to form a (long) chain/macromolecule</p> <p>M4 - product/polymer contains only single bonds</p>			3
			Total	4

Question number			Answer	Notes	Marks
8.	a		M1 (compound/molecule/substance containing) carbon and hydrogen (atoms)	Reject atoms/elements in place of compounds Reject molecules in place of atoms Reject mixture Accept C and H in place of carbon and hydrogen	1
			M2 only	M2 dependent on M1 or near miss, eg mixture of C and H Accept equivalent wording such as alone / purely / solely	1
	b		contains (C=C) double bonds	Accept multiple bonds Reject implied C=H	1

Question number				Answer	Notes	Marks
a	c	i		alkene(s)		1
		ii		C_nH_{2n}	Accept other symbols such as x Accept $H_{2n}C_n$	1
		iii	M1	same/similar chemical properties	Accept same/similar reactions Do not accept a specific reaction, eg they all burn Ignore similar reactivities	2
			M2	trend/gradation in physical properties	Accept named trend eg boiling point Accept correct trend eg smaller molecules have lower boiling points, but not incorrect trend such as smaller molecules have higher boiling points	
			M3	same functional group		
			M4	(neighbouring) members differ by CH_2		
					Any two for 1 each	

Question number			Answer	Notes	Marks
8	d	i	but-1-ene	Accept butene Ignore mention of cis or trans	1
		ii	C ₄ H ₈		1
		iii	M1 (compounds/molecules with) same molecular formula / same number of each type of atom	Do not penalise specific compound types, eg hydrocarbons / alkenes If elements/atoms in place of compounds, max 1 for Q Ignore references to chemical/general/empirical formula	1
			M2 different structure(s) / different structural formula(e) / different displayed formula(e)	Ignore atoms in a different order	1
		iv	displayed formula of but-2-ene or methylpropene	Accept cyclobutane or methylcyclopropane Ignore but-1-ene structure	1
	e	i	colourless / decolorised	Ignore clear	1
		ii	C ₂ H ₄ Br ₂	Insist on correct use of subscripts and cases of letters Do not penalise elements in different order Accept correct structural/displayed formula	1
				Total	14

Question 9

Question number	Answer	Accept	Reject	Marks
(a)	it /gasoline is used (as a fuel) for cars ignore references to uses of fuel oil and gasoline burning better	there are more cars than ships	Any other wrong use, eg domestic heating, aeroplanes, ships, etc	1
(b) (i)	C_4H_8	$2C_2H_4$		1
(ii)	Catalyst - silica / silicon dioxide / silicon(IV) oxide / alumina / aluminium oxide Temperature - 600 - 700(°C) If more than catalyst given, all must be correct	zeolite(s) / aluminosilicates Any temperature or any range within 600-700(°C) Equivalent temperatures in Kelvin		1 1 1

Total 4

10. a) (s) (aq) \rightarrow (aq) (l) (g)

reactants 1 mark

products 1 mark

acid

b)i) to prevent escaping while allowing carbon dioxide to escape

1 mark

ii) C

1 mark

c)i) A

1 mark

* Greater volume of gas collected each minute/final volume of gas reached more quickly

allow faster / steeper

1 mark

c)ii) 0.1 mol/dm^3

1 mark

Only half the original volume of gas is collected and so half the initial concentration must have been used.

1 mark

d)i) correct scale } *All points correct 2M*
correct points }
line of best fit } *1M*

1 mark

1 mark

1 mark

d)ii) As the concentration increases the rate of reaction also increases.

1 mark

It is directly proportional

1 mark

d)iii) More particles per unit volume/ More frequent/collisions/ More successful collisions per second

3 marks

More particles per unit volume

Total 16 marks

Collisions

more frequently / in same amount of time.

Question number	Answer	Accept	Reject	Marks
ii. (a) (i)	M1 - $\frac{144}{24\,000}$	One mark for $(144 \div 24) = 6$		1
	M2 - 0.006			1
(ii)	0.006			1
(iii)	M1 - $\frac{0.888}{0.006}$ M2 - 148 (<u>MUST</u> be a whole number)			1
(iv)	M1 - $(\text{CO}_3) = 60 \Rightarrow$ show steps in calculation.	answer csq on correctly calculated value of M2 (i.e. metal closest to calculated A_r), but <u>must</u> be a Group 2 metal		1
	M2 - 88			1
	M3 - Sr / strontium Mark csq throughout part (a)			1

Question Number	Answer	Accept	Reject	Marks
(b) 11.	Any two from: M1 - gas was lost between adding acid and replacing bung. M2 - bung does not fit/there are leaks in the apparatus M3 - some gas dissolved/reacted in the water M4 - the carbonate was impure M5 - the temperature (of the gas) was <u>lower</u> than room temperature/25°C			2
	Incomplete reactions not accepted		Total	10

perhaps due to the fact

an excess of nitric acid used.

Question number	Answer	Accept	Reject	Marks																
12. (a)	<table><tr><th rowspan="2">Salt made</th><th rowspan="2">Acid used</th><th colspan="2">Metal compound</th></tr><tr><th>Name</th><th>Solid or aqueous solution</th></tr><tr><td></td><td>sulfuric (acid)</td><td></td><td>solid</td></tr><tr><td></td><td></td><td>silver nitrate</td><td></td></tr><tr><td></td><td>nitric (acid)</td><td></td><td>solid/ aqueous/ solution</td></tr></table>	Salt made	Acid used	Metal compound		Name	Solid or aqueous solution		sulfuric (acid)		solid			silver nitrate			nitric (acid)		solid/ aqueous/ solution	correct formulae
Salt made	Acid used			Metal compound																
		Name	Solid or aqueous solution																	
	sulfuric (acid)		solid																	
		silver nitrate																		
	nitric (acid)		solid/ aqueous/ solution																	

Question Number	Answer	Accept	Reject	Marks
12. (c)	M1 - dissolve both (lead(II) nitrate and sodium chloride) in water	dissolve one in water		1
	penalise M1 if any other reagents added			
	M2 - mix/add (the two solutions)	react		1
	M3 - filter	decant		1
	M4 - wash <u>residue/solid/lead ((II)) chloride</u> (with deionised/distilled water)			1
	M5 - dry on filter paper/in a (warm) oven/leave to dry /heat	other sensible methods of drying	strong heating	1
			Total	12

Question number			Answer		Notes	Marks
13.	a	(i)	M1	more accurate	Accept more precise / gives an exact value	1
		(ii)	M1	(thermal) insulator / poor conductor / keeps heat in / reduces heat loss	Accepts traps heat	1
		(iii)	M1	stirring / mixing / swirling	Ignore name of apparatus used	1
		(iv)	M1	temperature goes down / stops rising / stays constant	Accept measure pH / when pH = 7 / when pH is less than 7 Reject changing to any pH value > 7 Accept use of any indicator (named example or just indicator) Ignore colour changes	1
	b		M1	19.4		1
			M2	23.1		1
			M3	3.7	CQ on temperatures recorded Penalise negative sign	1
					Penalise second decimal place values, except zeroes, for M1 and M2 M1 and M2 both correct but wrong way around scores 1	

UI - write full name in future

Question number		Answer		Notes	Marks
13.	c	(i)	M1	9 points plotted correctly to nearest gridline	2
			M2		
			M3	straight line of best fit through first 5 points	1
			M4	straight line of best fit through last 4 points	1
				If lines do not cross or are joined by curve or straight line, only M3 or M4 can be awarded	
		(ii)	M1	volume of acid CQ on where lines cross	1
			M2	maximum temperature CQ on where lines cross	1
				Do not award either mark if lines do not intersect Apply dp penalty once only Award 1 mark if both values correct but recorded in wrong places	
13.	c		M1	55 ($\times 4.2 \times 5.5$)	1
			M2	1270.5	1
				Accept any value between 1270 and 1271 Accept 1300 M2 CQ on M1 If vol used is 25, answer is 577.5 Accept any value between 577 and 578 accept 580 If vol used is 30, answer is 693 Accept 690 Ignore signs	
				Correct final answer without working scores 2 marks	

Question number			Answer		Notes	Marks
13.						
	d	(i)	M1	1.5×0.025		1
			M2	0.0375	Correct final answer scores 2 marks 37.5 scores M2 only	1
		(ii)	M1	$1800 \div 0.0375$ / $1800 \div$ answer to (d)(i)	Accept correct use of 1.8 in place of 1800	1
			M2	48 (kJ/mol)	M2 CQ on M1 provided 1800 or 1.8 used correctly If 37.5 in (a)(i) then answer is 0.048 (kJ/mol) Correct final answer scores 2 marks Ignore answer in J/mol Ignore signs	1
					Total 13 marks	